Tanaka Service Manual

PB-SM804SA,SM804SB
PB-SM806,SM807,SM808
TPB-450EX
Electric PowerBoard

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Revison 002

ISM, Inc. • 1028 4th Street SW • Auburn, WA 98001 • Phone: (253) 333-1200 • Fax: (253) 333-1212

www.tanaka-usa.com

custsvc@tanaka-ism.com

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Specification Chart

Construction	High Tensile Steel Frame with Wood Deck
Dimensions	40” High, 9.5” Wide
Tires	10” Kenda Pneumatic
Tire Pressure	50-60 psi
Wheels	Composite Core Split Rim
Brakes	Disc, Caliper
Range	60-75 Minutes, Approx. 12 Miles
Charge Time	4-5 Hours
Battery	Lead Acid, 24 Volt
Drive System	Chain
Motor	450 Watt, 24 Volt Continuous Output
Max Rider Weight	270 lbs.
Unit Weight	55 lbs. (approximately)
Charger	2 AH

Trouble Shooting

The following guide will help provide a logical sequence to quickly identify problematic areas of the PowerBoard to facilitate repair. Always bear in mind that the majority of electrical symptoms are actually the result of a problem with the chassis of the unit.

Before beginning the troubleshooting of the electrical system, inspect the following:

1. **Tires** - Make sure they are properly inflated. Check manufacture's recommended tire pressure listed on the side of the tire.

2. **Wheels** – Make sure that the wheel bearings are freely turning, and that neither the front or rear wheel is making contact with the chassis as to prevent it from easily rotating.

3. **Final Drive** – check to ensure that the chain is properly adjusted and not excessively worn. Sprockets should also be inspected, (see page 10).

Any factor that creates friction or drag to the chassis will result in lack-luster performance that can appear to be electrical. Other issues that can present themselves as electrical problems are operator usage. If the unit is used in very hilly areas, in excessive temperatures, or with an individual who is very heavy – then the battery capacity will be depleted much faster than in normal operating conditions.

PowerBoard will not go:

- Charge for twelve hours and re-try.
- Still no good - Unit may have popped the circuit breaker. Allow unit to cool completely, re-set the breaker by raising and lowering the kick-stand, (or with newer models turning power switch off/on/off/on.)
- Still no good - test batteries and charger.
- Still no good - test throttle wire.
- Still no good - test brake lever.
- Still no good - test electric motor.
- Still no good - replace circuit board.

PowerBoard will not go fast:

- Charge for twelve hours and re-try.
- Still no good - test batteries and charger.
- Still no good - test throttle wire, (NOTE: Only models with variable speed).
- Still no good - test electric motor.
- Still no good - replace circuit board.

PowerBoard will not go far:

- Charge for twelve hours and re-try.
- Still no good - test batteries and charger.
- Still no good - replace circuit board.

Safety & Shop Practices

The most successful and profitable service shops consistently seem to maintain the best habits of safety, cleanliness, and orderly procedure. The following information is intended as a guide towards developing habits that are necessary to accomplish satisfactory service work.

- Maintain a clean and orderly work area that is well lighted and adequately ventilated.
- Tools, instruments, and parts needed for work should be clean and readily available before any job is started. (Special tools available for servicing TANAKA equipment are listed in this manual.)
- Scooter should be cleaned before repair work starts. Cleaning will often help reveal a source of trouble.
- Before attempting to repair or operate any equipment, read and understand all information provided by the instruction manual for the equipment.
- Never attempt to service a unit that is running, or still heated from running, unless it is specifically required by the manufacturer's instructions.
- Wipe-up all spilled liquids immediately. Use non-flammable solvents for cleaning. Clean all parts before reconditioning or reassembling.
- Thoroughly inspect all parts for wear or damage. Replace all parts that show damage or excessive wear.
- Always recondition and/or repair equipment strictly according to the Manufacturer's specifications.
- Be sure all shields and safety devices are correctly installed before performing any final operating tests.
- After completion of any service or repair, the equipment should be thoroughly cleaned.

Routine Maintenance Guide

		Daily	Weekly	Monthly
All Fasteners	**Tighten**	**O**		
Chain / Sprockets	**Inspect/Adjust**	**O**		
Brake (front)	**Inspect/Adjust**		**O**	
Steering Head	**Inspect/Adjust**			**O**
Batteries	**Charge**	**O**		

Tools

The following is a minimum list of tools required to service the XTR-S Electric PowerBoard. Other tools may be preferable; however, complete service can be performed with the tools indicated below:

Test Wire (Part No. 31644)	**Jumper Wire Set (Part No. 31655)**	**Electrical Multi-Tester (Digital Type)**
This is a switch that is also a replacement part on some models of XTR-S PowerBoards. It plugs into the circuit board and serves as a special tool in diagnosing problematic functions.	This is a wire that can be used to test batteries on units with batery leads permanately attached to the controller board. (see page 18)	

Screwdrivers – Slot/Phillips	**Mallet**	**Head Wrench (Part No. 31254)**

Wrenches – 8,10,13,17mm	**Long Handle Allen Wrenches – 3,4,5,6mm**

Brake Adjustment

Figure 1

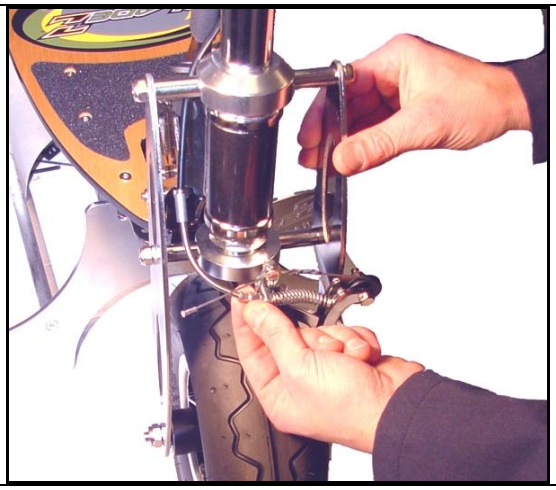


Figure 2

Two adjustments can be made to the brake system. First, use the adjustment located on the caliper, near the wheel (**Fig. 1**). Begin by loosening the lock-nut with an 8mm wrench, and then turn the adjuster out (counter-clockwise) (**Fig. 2**). Once adjusted, tighten the lock nut to hold that position.

Make sure the brake caliper is not loose. Conversely, over-tightening will not allow the wheel to turn. Full braking action should occur with approximately one-third to two-thirds throw of the brake lever.

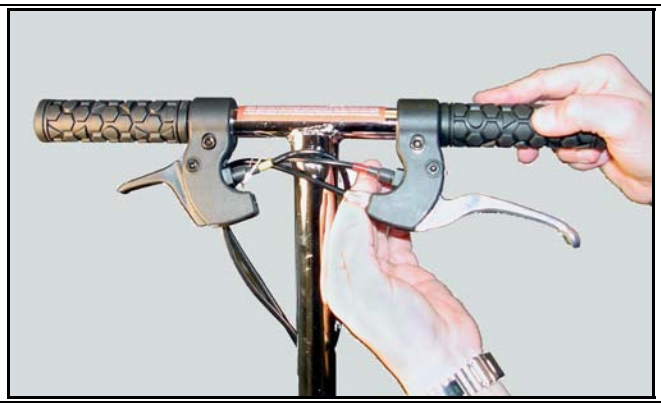


Figure 3

Figure 4

The design of the brake lever (mounted on the handlebar), provides another type of adjustment to the brake cable. Simply loosen the lock nut, and turn the adjuster out (counter clock-wise), until the desired adjustment is reached, then re-tighten the lock nut (**Fig. 3**).

When neither of these adjustments allows an acceptable amount of braking action, it's an indication that the brake pads may be worn beyond their service limits and or the cable has stretched. In either case, spares should be installed.

Brake pads are simply slid into place (**Fig. 4**), but it requires that tension be taken off of the cable to allow the new pads to be fitted. Note that the pads are not identical, and it is necessary to match the pad with the appropriate brake actuator arm.

Wheel Removal - Front Wheel

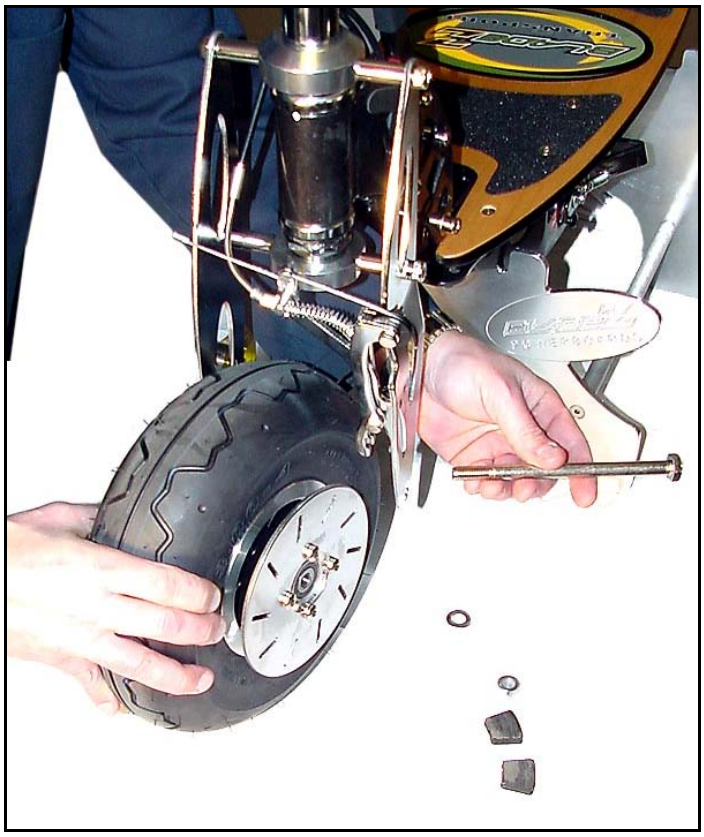


Figure 5

Figure 6

The front wheel is held in place with a solid axle, and can be removed with two 17mm wrenches and/or sockets. Remove the locking nut from one side of the wheel, and gently tap the axle through the wheel. This will free the wheel assembly from the frame. (Fig. 5)

To disassemble the wheel for servicing the tire and/or tube, you must first remove the brake disc. Removal requires a 4mm hex wrench. Note that each of the four bolts use spacers between the disc and the wheel. With the disc removed, it is possible to access the four bolts and nuts that secure the two halves of the wheel assembly together. (Fig. 6) The hardware securing the two wheel halves will require a 13mm wrench or socket and a 6mm hex wrench.

⚠ **CAUTION**: **Be sure to deflate the tire prior to attempting to disassemble the two wheel halves. Tire and components can cause serious injury if you attempt to separate while inflated.**

With the wheel disassembled, it is advisable to check the integrity of the two ball bearings that ride within the hub of the wheel. If they feel worn or do not turn freely, replace them.

Upon re-assembly, ensure that the three axle spacers are properly positioned.

Wheel Removal – Rear Wheel

NOTE: Extreme caution should be used when servicing the drive chain or rear wheel. Service or maintenance involving the chain should ONLY be performed when power to the electric motor has been disconnected from the battery.

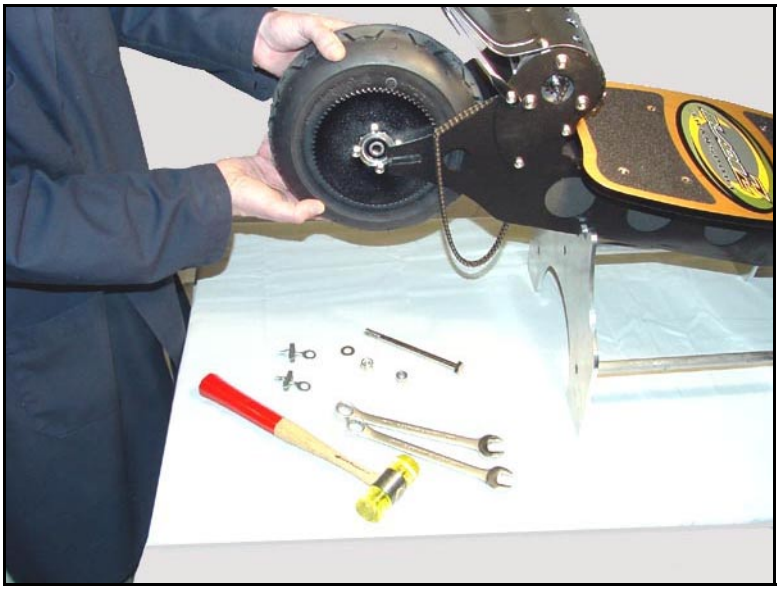


Figure 7

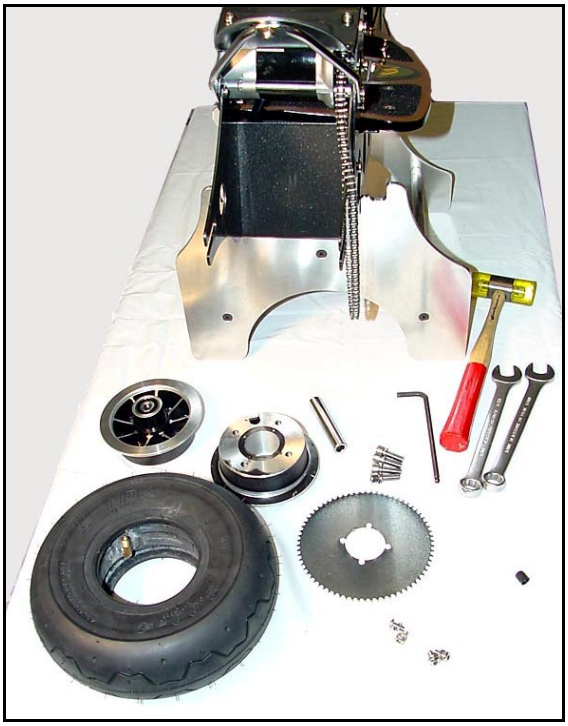


Figure 8

Begin by removing the axle lock-nut with a 17mm wrench or socket. Gently tap the axle through the wheel. This will allow the rear wheel assembly to be slid forward far enough to remove the chain from the rear sprocket. With the chain removed the entire rear wheel can be separated from the PowerBoard.

To disassemble the wheel, begin by removing the rear drive sprocket, which is attached with four hex-hole screws on newer models, and is threaded to the hub on earlier versions. Next, remove the four large allen head bolts. The hardware securing the two wheel halves will require a 6mm hex wrench.

⚠ **CAUTION**: **Be sure to deflate the tire prior to attempting to disassemble the two wheel halves. Tire and components can cause serious injury if you attempt to separate while inflated.**

With the wheel disassembled (Fig. 8), it is advisable to check the integrity of the two ball bearings that ride within the hub of the wheel. If they feel worn or do not turn freely, replace them.

Upon re-assembly, ensure that the three axle spacers are properly positioned.

Steering Head Components / Rigid Fork Model

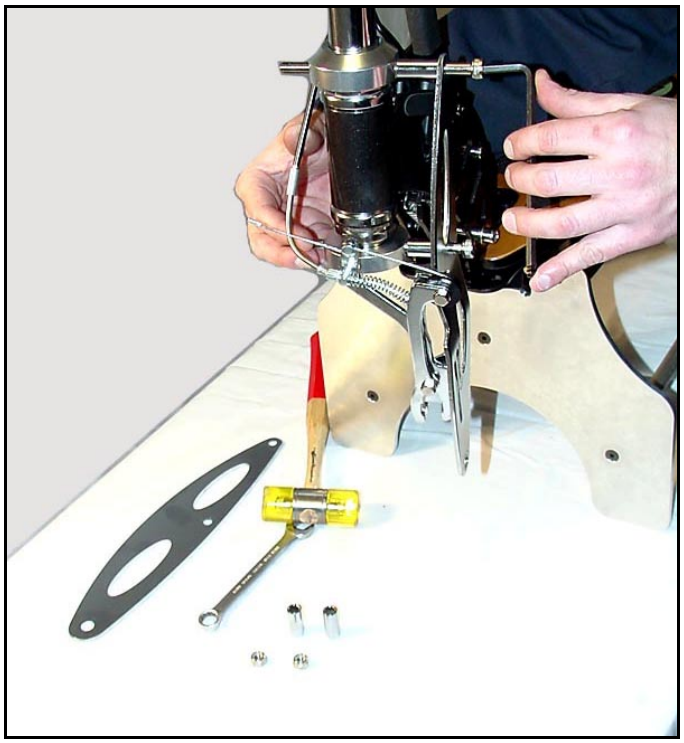


Figure 9

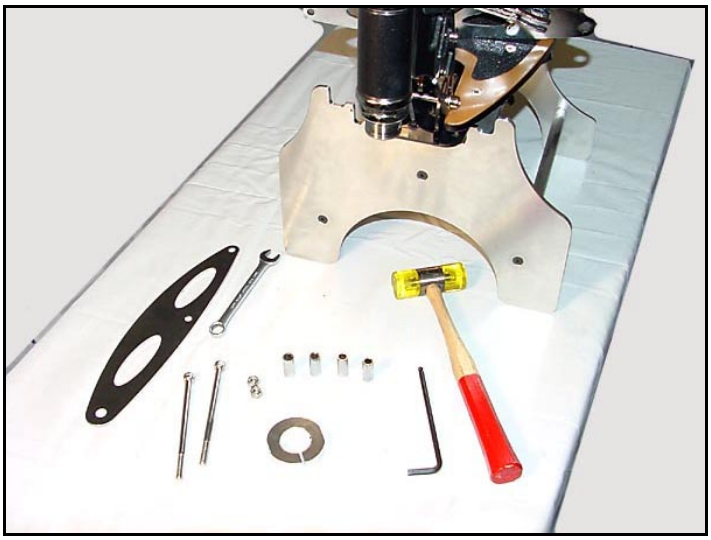


Figure 10

Disassembly:

First, remove the two bolts, four spacers and lock nuts that secure the forks to the steering head. This requires either a 5mm or 6mm hex wrench, and a 13mm wrench or socket. Remove the lock nuts on the bolts, and gently tap them through the steering head assembly (Fig. 9). Use caution not to damage the threads as you remove the bolts. With the entire front wheel and forks removed (Fig. 10), the steering head can now be disassembled.

Steering Head Components / Rigid Fork Model cont.

Figure 11

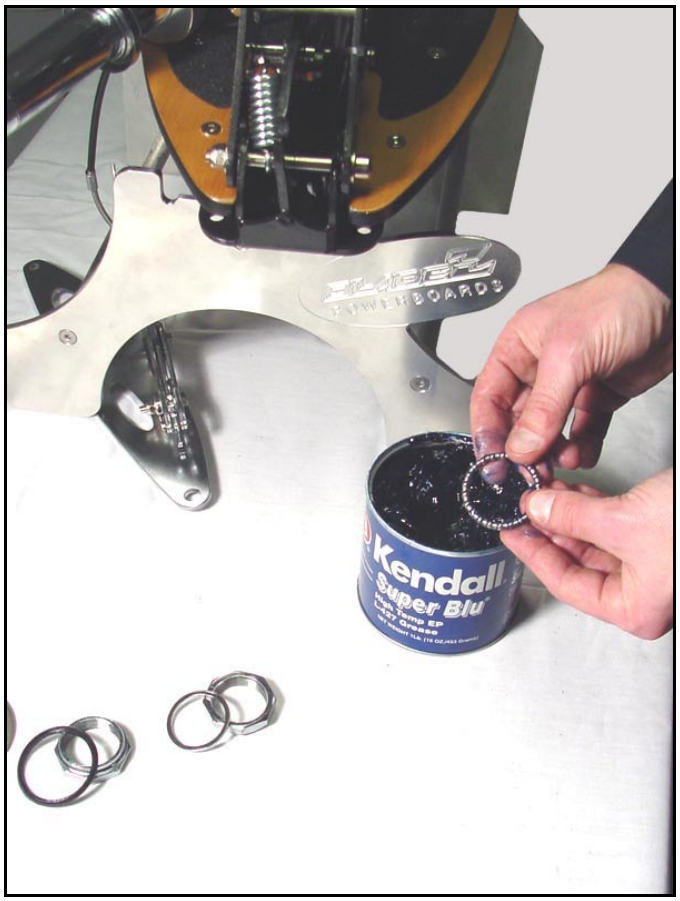


Figure 12

Slide the upper cap up the handlebar stem, and out of the way. Remove the lower cap. Removal of these caps reveals the large, 40mm nuts that secure the steering head assembly from the top and bottom. It is not necessary to remove the large top nut. The steering head is held in place by two bottom 40mm nuts. One is intended to provide adjustment, and is closest to the steering head, and the one directly beneath it is a jamb nut to ensure they do not come loose in operation.

With these bottom nuts removed, remove the lower bearing and spacer. This will enable the entire down-tube, with the upper bearing, to be slid out the top of the steering head. It will be necessary to fold the front steering handle to the down position (Fig. 11) to allow enough slack in the control cables for the steering stem to be lifted from the steering head.

Take the opportunity to thoroughly clean all parts with cleaning solvent, and inspect bearings. If they feel worn or do not turn freely, replace them. Re-grease the bearings and carefully re-assemble.

Steering Head Components / Suspension Fork Model

Note: The suspension forks used on the XTR-S models are designed to accommodate a wide range of riders and terrain and are NOT adjustable.

⚠ **WARNING**: Never attempt to disassemble the lower fork tubes. They contain a factory installed spring under considerable tension. Disassembling the forks will release the spring and cause serious injury or death.

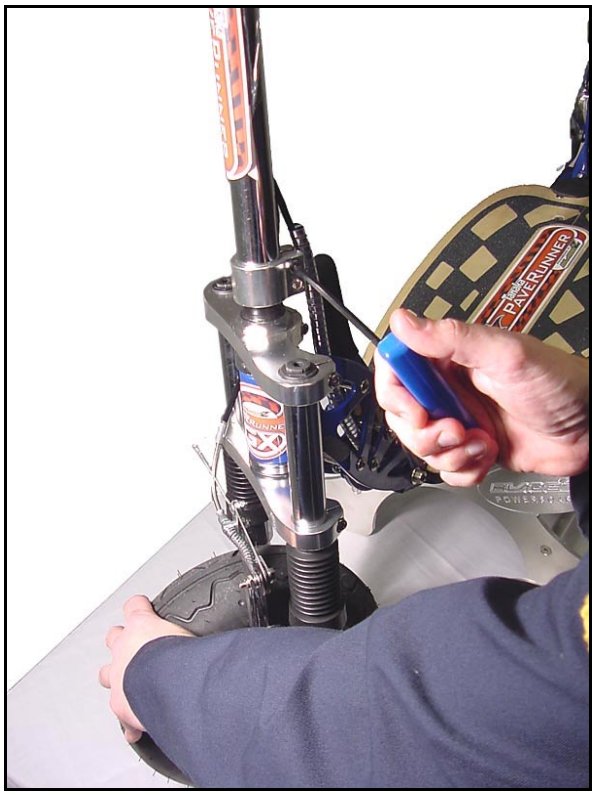


Figure 13

Figure 14

Front end disassembly:
Begin by separating the top steering stem from the fork assembly by removing the three hex bolts that secure the clamp bracket around the stem, (fig. 13), followed by removal of the locking nut, (fig. 14).

Steering Head Components / Suspension Fork Model

Figure 15

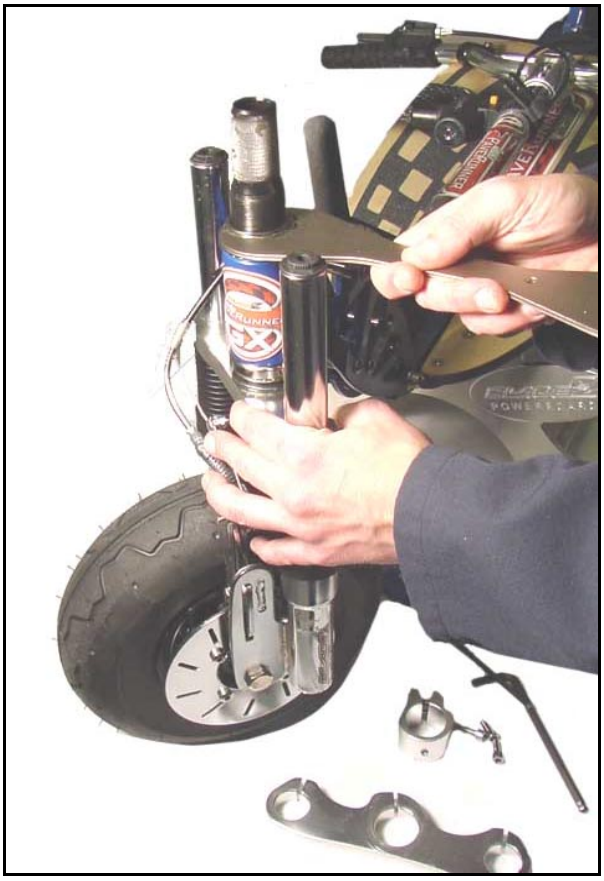


Figure 16

Next, remove the three pinch bolts that attach the upper and triple clamp supports to the fork tubes and the steering head, (fig. 15), followed by removal of the bearing adjustment nut, (fig.16).

With these components removed, the fork unit can be removed from the steering head through the bottom. Note: If it is not necessary to service the brake or wheel components, they can remain attached to the lower triple clamp support and fork tubes, while servicing the steering head components.

Take the opportunity to thoroughly clean all parts with cleaning solvent, and inspect bearings. If they feel worn or do not turn freely, replace them. Re-grease the bearings and carefully re-assemble.

Chain Maintenance

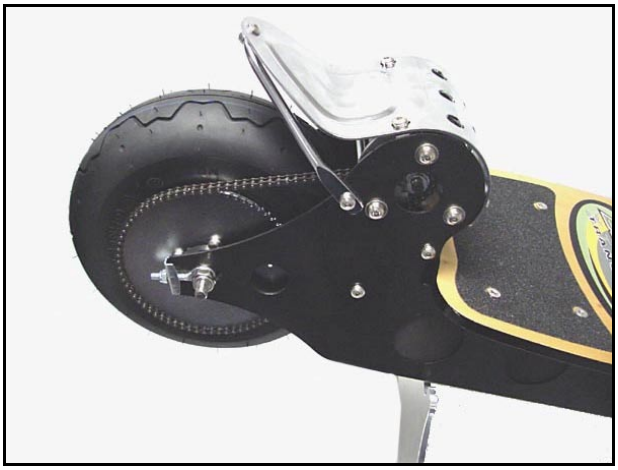


Figure 16

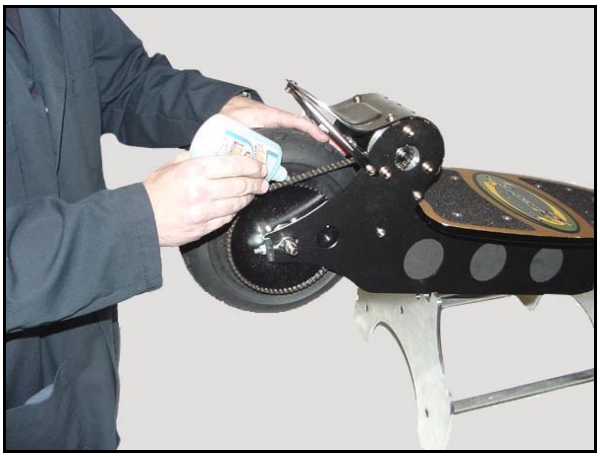


Figure 17

The XTR uses a number 25 drive chain to supply power to the rear wheel. (Fig. 16)

Extreme caution should be used when servicing the drive chain. Service or maintenance to the chain should ONLY be performed when power to the electric motor has been disconnected from the battery.

The chain should be lubricated at regular intervals. Applying a commercially available chain lube, such as WHITE LIGHTNING, after every re-charge of the batteries is ideal. Follow the directions provided by the chain lube manufacturer. (Fig. 17)

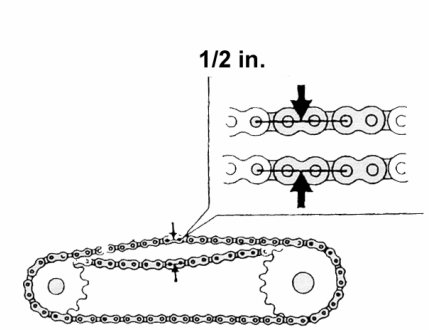


Figure 18

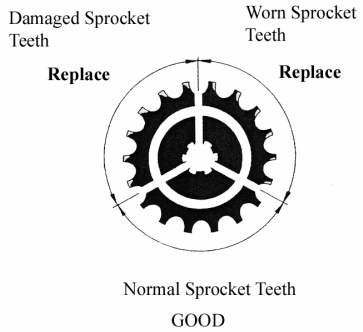


Figure 19

To adjust the chain tension, begin by checking the slack in the upper drive chain run midway between the sprockets (see figure 18). Drive chain slack should be adjusted to allow ½" of vertical movement by hand. If the chain is slack in only certain areas, then some links are kinked and binding. This can frequently be eliminated with lubrication.

Wear on sprockets is illustrated in Fig.19. If sprocket teeth show signs of hooking, or wearing on the teeth, they should be replaced.
A worn sprocket will quickly damage a new chain and vice-versa. Chains and sprockets should be replaced as a set.

Deck Removal

Figure 20

The XTR deck is secured to the frame with 10 bolts, (standard wood version – aluminium billet decks have less fasteners), requiring a 4mm hex wrench and a 10mm open-end wrench. Some of these bolts are secured on the bottom side with locking nuts, and some of the bolts are simply threaded into the frame itself. For those bolts secured with nuts on the underside, remove the nuts prior to attempting to remove the bolts from the top.

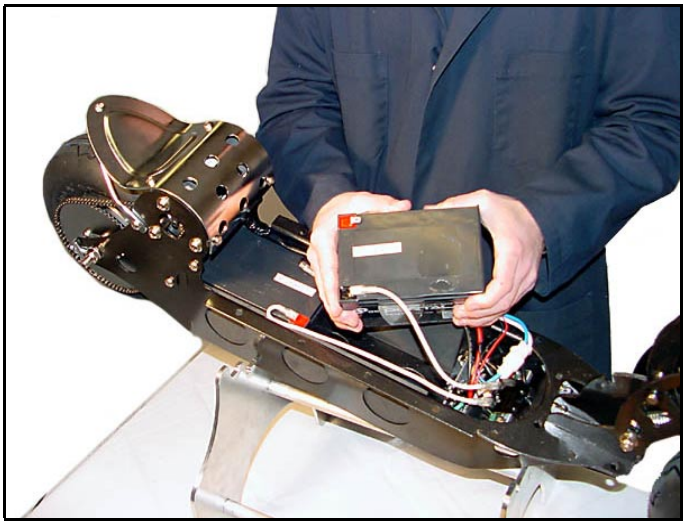
Additionally, some of the mounting bolts may be covered by grip tape, and access to them will require the removal of the grip tape.

Inspect the board for any damage and replace as necessary. When re-installing a deck, always ensure that all fasteners are used, and that an adequate amount of grip tape is re-applied to ensure sound footing when in operation.

Electric Drive Components

The following section will help to identify the components, and conduct tests to identify problems within the electrical system.

General System Description



The XTR electric PowerBoards use two 12 Volt batteries in tandem to supply current to a 450 Watt continuous electric motor, (300 Watts on the earliest version).

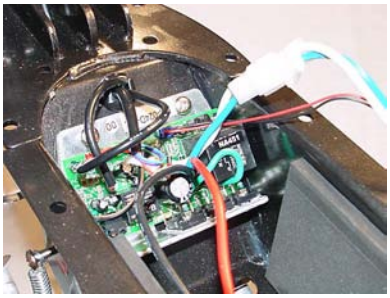


Figure 21

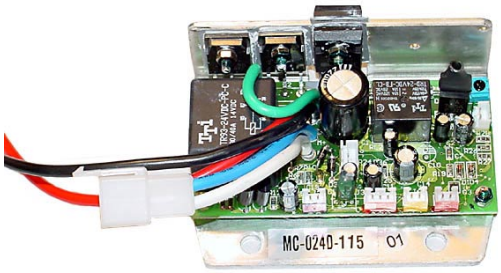


Figure 22

Figure 22A

Power is managed by a CPU controller board mounted to the front of the battery compartment, (Fig. 21). High tension leads connect the system to a circuit breaker to protect the controller board from overload. The XTR PowerBoards have used several different versions of circuit boards to accommodate slight differences in the features and placement of components. Before ordering circuit boards as spare parts, be sure to identify the number on the actual circuit board as it will be necessary to ensure ordering the correct part, (Fig. 22). Newer models utilize a controller board mounted inside a sealed case. This helps prevent contamination from dirt and moisture. (Fig. 22A)

General System Description (cont.)

Functions controlled by the circuit board include the charger, the throttle lever, the brake lever, and on some models, the kickstand, indicator light and on/off switch.

Circuit Breaker

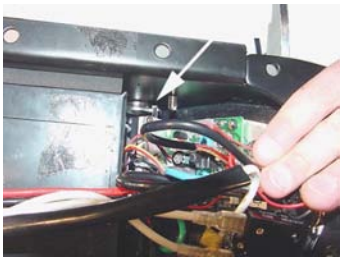


Figure 23

Figure 24

Figure 25

The circuit breaker is attached to the batteries only. It is intended to shut off power to the system in the event the motor is overloaded. This can be the result of several different factors. For example, the weight capacity of the unit has been exceeded, the unit is run in excessively hot temperature or the operator attempts to climb a hill beyond the units ability. If any of these cause the circuit breaker to trip, two things will need to happen for the unit to function again. The unit must have sufficient time to cool, and the breaker will need to be reset. The breaker is reset on earlier models with the kick-stand. When the stand is down, it trips a switch on the circuit board, (see fig. 23). Moving the stand up/down/up will reset the breaker. On newer models, turning the on/off switch on/off/on will reset the breaker, (see fig.'s 24 and 25).

Cables / Controls

On the XTR PowerBoard, the front disc brake and throttle are cable actuated. Cables should be periodically inspected to ensure that they move smoothly, and offer full range of motion in order to maximize braking ability and full range of throttle. Cables that have been kinked, corroded, frayed or worn significantly should be replaced.

Brake

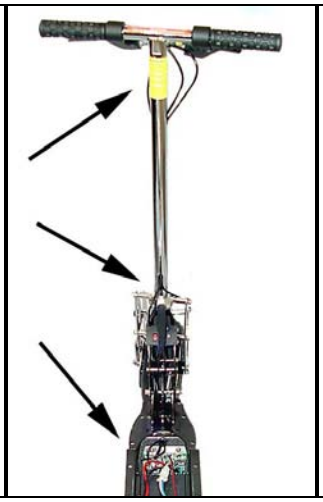


Figure 26

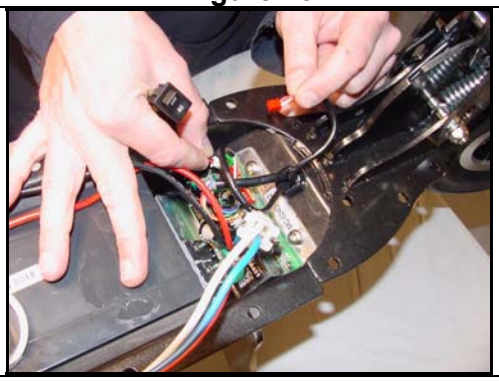


Figure 27

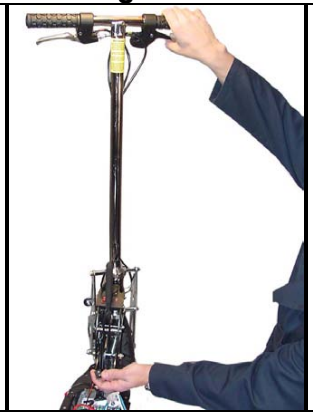


Figure 28

The brake lever mounted to the handlebar actuates the front disc brake. Refer to page 6 for service and adjustments to the mechanical front brake system. The brake lever interfaces with the wiring harness of the unit in one respect; the lever contains a wire routed to the circuit board that shuts down power to the electric motor for safety. In other words, the throttle and brake cannot be operated simultaneously. A malfunction of the brake safety switch will allow the unit to continue to drive the rear wheel with the brake lever activated. This can pose a hazardous condition and should be repaired before any further use of the PowerBoard. A defect in the system could indicate a problem with the lever and it's wire, or a problem within the circuit board. Testing is done by bypassing the switch to verify if the problem is within the circuit board, or within the lever and it's wire.

To test the safety shut off switch you'll first need to remove the deck from the frame. Next, identify the wire going from the brake lever to the controller board, (see fig. 26). The wire mates to the circuit board via a small plug-in connector. Remove the plug from the board, and attach the test switch (part #31644), to the plug receptacle intended for the brake wire, (Fig. 27). Be sure the switch is in the off position before attaching to the board. With the rear wheel elevated to allow it to turn safely, depress the throttle lever to activate the rear wheel. While power is driving the rear wheel, turn the switch to the off position, (Fig. 28). Power should stop flowing to the motor.

If the power is interrupted when conducting the test above, then the problem is NOT with the circuit board and it will be necessary to replace the brake lever / wire assembly.

If the switch fails to shut off the power when tested as described above, then the circuit board has failed and will need to be replaced.

Cables / Controls Cont

Figure 29

Figure 30

The throttle, or speed, is actuated by the right hand lever on the handlebars, and allows power to flow from the batteries to the electric motor. Some models have a throttle that is variable speed control as depicted in fig. 29, while some simply are on/off as shown in fig. 30.

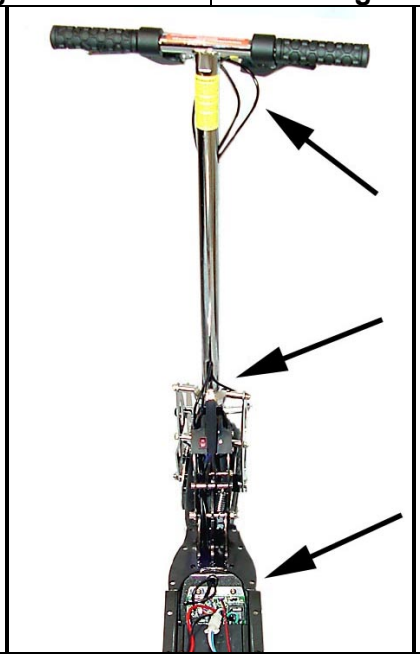


Figure 31

To test the throttle lever function, first remove the deck from the frame. Next, identify the wire from the lever to the circuit board. Remove the plug from the board, and attach the test switch (part #31644), to the plug receptacle intended for the throttle wire. Make sure the switch is in the OFF position before attaching to the circuit board.

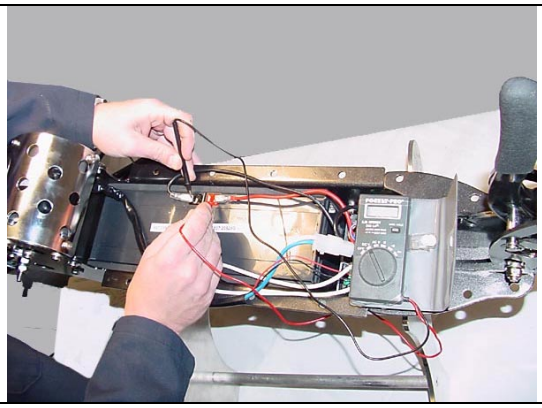
Note: On newer models, using the sealed case type of controller board, it is not possible to test the throttle in this manner. The only way to troubleshoot the throttle function on these models is with a new throttle lever/wire assembly.

Figure 32

With the rear wheel elevated and safely clear of anything, turn the switch to the on position. If power is transmitted to the rear wheel, then the problem is NOT with the circuit board function, and the throttle lever / wire assembly will need to be replaced.

Batteries

The batteries in the XTR-S models are maintenance free type and can be permanently damaged if the outer case is opened for any reason. Warning: Batteries contain sulphuric acid (electrolyte) which is highly corrosive and poisonous. Getting electrolyte in your eyes or on your skin can cause serious burns. Wear protective clothing and eye protection when working near batteries.
KEEP CHILDREN AWAY FROM BATTERIES.

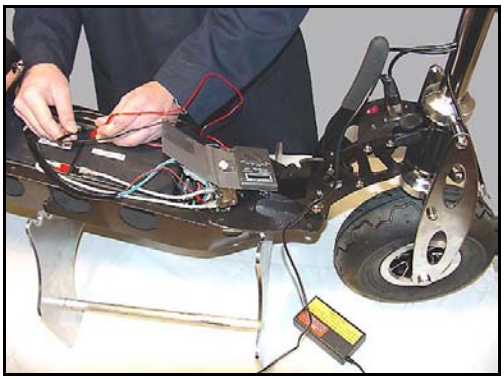


Begin by charging the batteries overnight to ensure that they have had ample opportunity to accept a full charge. Next, remove the deck from the frame to provide access to the batteries. Using a voltage meter, measure the voltage in each battery individually. NOTE – testing the batteries at the charging receptacle can be misleading. Always test battery integrity by applying a volt meter to each battery with the deck removed.

This test should reveal at least 12.5 volts each. If either battery contains less than this amount after adequate charging time, it will be necessary to replace the batteries. A battery with a reading of 10 volts or less indicates a completely dead battery that will not accept a charge.
NOTE – batteries must be replaced as a set. Replacing one battery will lead to the failure of both the remaining original battery as well as the new single replacement.

Battery Charger

The battery charger is intended to supply a current to the batteries in excess of 24 volts. If the PowerBoard has been attached to the charger for sufficient time, yet the unit does not perform as if fully charged, it requires testing.



With the deck removed, plug the charger into a wall receptacle and into the PowerBoard charging receptacle, (as if charging normally). Then, using a voltage meter, attach the probes to the respective positive and negative battery terminals ON THE SIDE OF THE BATTERIES NOT CONNECTED TO THE CIRCUIT BREAKER. Under these conditions, the volt meter should have a reading in excess of 25.5 volts, (as high as 29.5 volts is normal). If the voltage registers in this range, the charger is working correctly to supply current to the batteries. Less than 24 volts would indicate a defective charger.

Electric Drive Motor

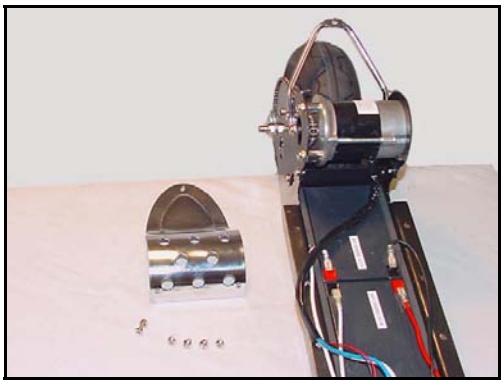


Figure 33

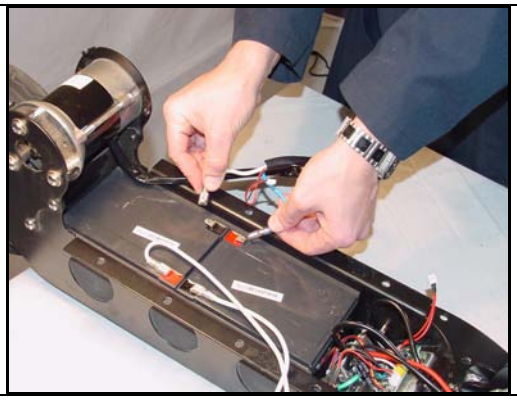


Figure 34

The electric motor that provides power to the rear wheel is a 450 Watt (300 Watt on earliest models), continuous cycle motor, connected to the batteries via two lead wires. Typically, the motor either works, or does not. After you are confident that the batteries are accepting and retaining a full charge, it is easy to test the motor.

With the deck off of the PowerBoard, remove the battery leads from the controller, and from the batteries. To ensure the drive motor works, connect the motor leads directly to the battery terminals. This effectively bypasses the circuit board, and sends power direct from batteries to the motor.
NOTE: Attaching lead wires to battery will create a spark.

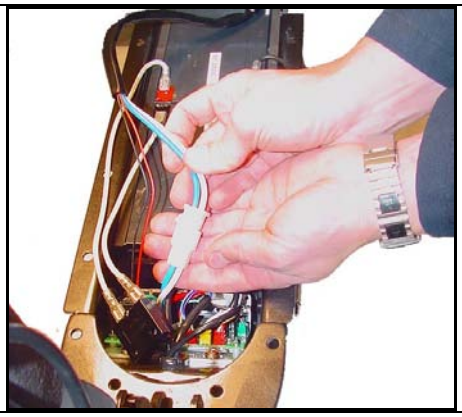
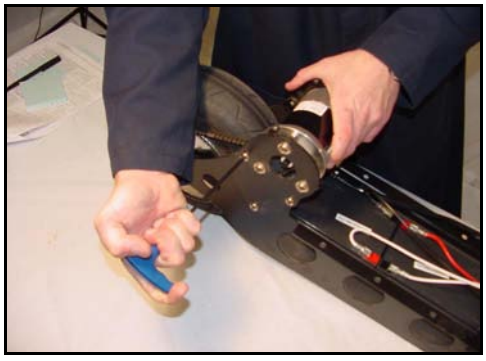
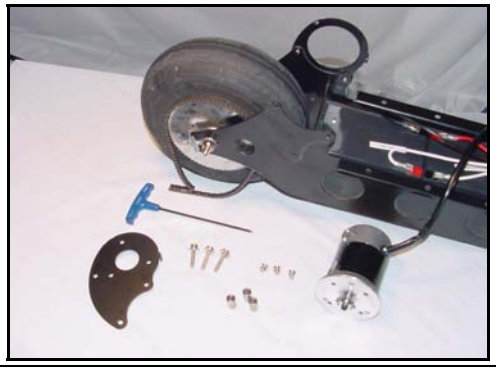


Figure 35

NOTE: Newer models do not have lead wires form the motor that are detachable from the circuit board. Instead they use a coupler plug to connect to the circuit board, (see fig. 35). This make testing the drive motor a little more difficult. On these models, it is necessary to "jump" from the plug attached to the motor side of the lead wires to the batteries, but is effectively the same procedure as described above.
A special tool is available that has the proprietary plug to attach to the harness and battery terminals on these models and can be ordered as part# 31655.





If the motor does not turn when tested this way, it is defective and must be replaced as an assembly. Removal of the motor is made simple by the two sub-frame pieces on either side of the frame. Removal of the bolts on chain side only will allow the removal of the motor.